

## **The Introduction of Unmanned Aircraft into the National Airspace System**

### **Topic:**

As we begin the second millennium of flight dynamic changes are occurring related to the types of aircraft that are operating in the global airspace infrastructure. “Unmanned Aircraft” (UA) have evolved to become recognized participants in the next generation of modern global aircraft.

Historically these aircraft have been target drones and remote control (RC) “models”. Today, they can be sophisticated, semi, or fully autonomous aircraft operating on missions encompassing global flights.

The dramatic shift, from the realm of sport and recreational aviation, to intricate partners in military doctrine, and crucial components of security and reconnaissance missions performed by federal and state agencies, is accelerating the demand on authorities to address the operational requirements of these new aircraft.

Accompanying this exponentially increasing use of UA by military, federal and state agencies is a burgeoning civil component of the UA industry. Here, manufacturers and operators are proposing to, or are producing, aircraft that fill niche markets unimagined just a decade ago. Airships that will replace satellites as communication platforms over cities, tiltrotors utilized for aerial applications, and while whimsical at first glance, home delivery of medicines, groceries, and even specialty food such as pizza deliveries, are being studied.

To address the incredibly complex demands that UAs will place on the National Airspace System (NAS), the FAA has called for, in its strategic planning document *FAA Flight Plan 2004 – 2008* the development of “...policies, procedures and approval processes to enable operations unmanned aerial vehicles (UAV).”

The goal is daunting. The challenges of defining “equivalent levels of safety”, developing “sense and avoid” technologies, integrating in the NAS an array of aircraft ranging from a few grams to multiple ton vehicles and whose airspeeds, altitudes, missions, and operating capabilities exceed those of aircraft operated today are enormous, but not insurmountable. Each represents a unique set of challenges to Air Traffic, as well as the Aircraft Certification and Flight Standards Services.

How do we begin? To answer that question I’d like to offer insight into how unmanned aircraft have been operated, on a limited scale, in the NAS to date.

By the mid 1990’s, technology had advanced to a point where system integrity made operational capabilities a reality. To address the growing demand and accommodate military needs to fly a multitude of types of vehicles, the FAA began allowing UA operations through the issuance of Certificates of Authorization. These Certificates of Authorization or COAs were, and remain, issued under FAA Order 7610.4, Special

Military Operations. They authorize use of defined airspace and include Special Provisions unique to each operation. For instance, the COA may include requirements to operate the aircraft in VFR conditions. Most require coordination with the appropriate Air Route Traffic Control facility, and include an onboard requirement for at least a Mode 3 transponder. Traffic de-confliction necessitates the use of a ground observer(s) who at all times maintains visual contact with the aircraft, or the use of “chase” aircraft to accompany the UA. Currently, there are approximately 50 active COAs being utilized in the United States.

The COA process has functioned well, enabling research and development efforts and providing a means to introduce UAs into the air traffic processes. However today, with the burgeoning civil market, and the desire to “file and fly” these aircraft in a manner so that they are transparent to other airspace users, a new paradigm must emerge. And this paradigm must include a methodical introduction of civil UAs into the NAS, and into the public conscious, demonstrating a level of safety equal to or exceeding that which exists today.

To attain that level of safety, operational procedures will need to be modified to provide for UAs unique needs. A further understanding of the design and limitations of the aircraft will be required so that appropriate levels of certitude can be developed. And, for the first time, authorities will be looking at certification of not just the aircraft, but the complete aircraft system, including the datalink infrastructure, ground control station, as well as the pilot/controller components.

To begin this transition the FAA is considering a path of “enhancing” our COA process to include a “General Airworthiness Review” as well as an “Operational Review” of the proposed activity.

It is believed that as an interim step, the enhanced COA methodology of integrating civil UAs into the NAS will provide the time needed to gain an in-depth understanding of these aircraft and their operational as well as airworthiness characteristics. The process will also provide time for other agency requirements to be addressed. For instance the recently formed Department of Homeland Security may have “command and control” and other security requirements that will have to be identified and mitigated. Noise and Emission studies will have to be undertaken to address concerns forthcoming related to environmental issues. Also, human factor research will be wide-ranging as we identify the appropriate levels of human-machine interface.

In summation, the challenges are many, with safety paramount! The FAA has and will continue to work closely with the JAA and other Authorities to integrate this new dimension of aviation into national and international airspace infrastructures. By working together in the development of harmonized standards, policies, procedures, and regulatory requirements we can ensure a smooth transparent introduction of these aircraft into the aviation infrastructure and the accompanying public acceptance of this fascinating new dimension of aviation.